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THE INFLUENCE OF GOVERNMENT ADMINISTRATION ON THE PERFORMANCE OF SERVICE CONTRACTORS

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APPROVAL STATEMENT

This report has been reviewed and approved.

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ABSTRACT

This report documents the results of a study conducted in fulfillment of the requirements of the Master of Science Degree in Engineering Management at the University of Tennessee Space Inistitute. The subject of the study, although not conducted by the Air Force at Arnold Engineering Center is pertinent to the service contractor relationship at the Center.

The objective of this study was to determine if the way the Government manages its service contracts adversely affects the contractors performance. The study examined the relationship and its effect on performance, efficiency, morale and organization. The results were compared to the results obtained from an examination of the relationships in an institutionally managed service contract.

The study found that the biggest dissatisfier in the Government administered contractor was rules and regulations while the Institutionally administered contractor identified organizational structure as the biggest dissatisfier. The institutionally administered contractor had a higher morale and performance score than the Government contractor. There was little difference found in the scores for efficiency between the two contractors.

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INTRODUCTION

BACKGROUND

The Arnold Engineering Development Center (AEDC) is one of four test and evaluation centers in the United States Air Force. Its' wind tunnels, space chambers, ballistic ranges, and jet and rocket test cells give it the distinction of being the most comprehensive aerospace ground test facility in the world.[1]

Tests conducted in these facilities have helped to significantly accelerate the evolution of man's progress in the world of flight.[2] The center continues to push for progress by predicting how existing and new untried aircraft, missile, rocket, and spacecraft components will perform in actual operation.[3] In doing this, the personnel at AEDC must continuously modify the existing equipment and develop and use new equipment and techniques in order to test and evaluate the high technology, complex systems of tomorrow.

The personnel at AEDC are made up of Air Force and operating contractor personnel. The Air Force, staffed by military and civilian government employees, directs , schedules, plans and budgets the activities of the Center.[4] The operating contractor personnel, provided by three private companies, are responsible for conducting the tests and providing technical and nontechnical support services. The services range from analyzing test data to facility maintenance as well as janitorial services.[5]

The first contractor, Sverdrup Technology Inc., operates and maintains the air breathing jet engine and small rocket motor test cells in the Engine Test Facility (ETF) and the Aeropropulsion Systems Test Facility (ASTF) located on the Center. The second operating contractor, Calspan/Arvin, operates and maintains the Propulsion Wind Tunnel (PWT) and the Von Karman Gas Dynamics Facility (VKF). The PWT facility tests large scale models of missiles, satellites, and space vehicles while VKF tests the effect of air flow on various shaped (old and new) aircraft, missiles, satellites and their associated components.[6] The third contractor is Pan Am World Services, Inc.; they are tasked with providing technical support, utilities, and overall maintenance to the Air Force and the other two operating contractors. It is the Air Force influence on the organizational

structure of these companies and its effect on their employees that this study attempts to examine.

PROBLEM

An elementary, limited scope study by Nelson, et al,[7] conducted in May 1983 attempted to subjectively determine the contextual factors and their effect upon a small group of contractor employees providing highly technical support to the Government. The group consisted of approximately seventy engineers, engineering associates and technical assistants. Of the contextual factors examined, two were found to have the most influence on the group. The two were the Air Force and another contractor providing technical support services to the group.

The study concluded the Air Force had the greatest influence on the group and exerted this influence through the numerous rules and regulations imposed by the service contract. These rules and regulations allowed the Air Force to dictate the work load, and in some cases, how to do the work. It appeared the contractor's organization structure was influenced by the rules and regulations and this in turn had an adverse effect on the technical employees.

It was found that, although the group had a matrix structure and organic characteristics, there were mechanistic characteristics present that are usually associated with and indicative of the classically bureaucratic organization. Statements made by some of the group members during informal interviews and discussions brought these facts out. Based upon these findings, the study members theorized that the organization had predominantly mechanistic characteristics such as sluggish response to complex problems, low efficiency, moderate morale and a tremendous number of rules and regulations. The organization was considered overall classical bureaucratic with many mechanistic characteristics.

The final assessment was that the Air Force, through its regulations and procedures set forth within the service contract, had driven the contractor's organization to adopt many of the characteristics of a bureaucratic organization. It appeared that a line-staff structure was perceived as necessary to comply with the

rules and procedures imposed regardless of the type of structure deemed by the contractor as appropriate. The imposition of a line-staff structure with many mechanistic characteristics was identified as the cause of low morale and efficiency among the engineers and technical people.

DEFINITIONS

Before proceeding further, it will be beneficial at this point to define the terms bureaucratic, mechanistic and organic. Bureaucratic should not be construed as indicative of an organization fraught with red tape and inefficiency. Instead, the term should be understood as defined by Max Weber.

An organization that has:

1. Well defined hierarchy of authority
2. Clear division of work
3. System of rules covering the rights and duties of position incumbents
4. System of procedures for dealing with the work situation
5. Impersonality of interpersonal relationships
6. Selection for employment and promotion based on technical competence

The term mechanistic and organic should be understood as defined by Burns and Stalker. Mechanistic is a term describing a system characterized by highly specialized jobs, centralization and vertical communication.[9] Organic should be taken to describe a system just the opposite of a mechanistic system. That is, a system characterized by job generalization, decentralized authority and decision making, and exhibiting good communication horizontally as well as vertically throughout the organization.[10] A bureaucratic organization will exhibit mechanistic characteristics, but not necessarily have line-staff structure. A matrix organization will exhibit organic characteristics. The existence of a bureaucratic structure does not necessarily indicate a poor organization, and the presence of mechanistic characteristics do not necessarily indicate the presence of a bureaucratic organization.

SCOPE

From the findings and conclusions of the aforementioned study by Nelson, et al., it was hypothesized that the Government regulations and procedures imposed upon its service contractors tended to push them to adopt a line-staff structure with many bureaucratic, mechanistic characteristics, and this inturn adversely effected the performance, efficiency and morale of their technical employees. To validate this hypothesis the organizational structures of the three operating contractors at AEDC were examined along with the resulting effect on performance, efficiency and morale. Randomly selected engineers, draftsmen and employees who interface with the high technology projects were surveyed to determine their attitudes toward the organizational structure, and the performance, efficiency and morale of their work group. Group was define as those who work with the respondent and report to the same supervisor.

APPROACH

In order to determine the influence the Air Force, at AEDC, has on the organizational structure of the operating contractors, and through this their employees, the results were compared to the survey results obtained from the technical employees, engineers and draftsmen of the Coal Fired Flow Facility (CFFF).[11] The CFFF was chosen for comparison purposes because it too is a contractor operated facility for conducting tests and providing operation and maintenance service. The only difference between the CFFF and the AEDC contracts is that the CFFF contract is with the Department of Energy and administered by the University of Tennessee Space Institute (UTSI).[12]

UTSI is part of the University of Tennessee system and offers only curriculum leading to engineering and science graduate degrees at the Master and Doctoral level. The CFFF under UTSI direction performs research and development in energy conversion technologies, primarily "magnetohydrodynamics" (MHD), although all types of coal fired systems

are tested. Scientists and engineers, using newly developed techniques and materials suited for the high temperature plasma field, strive to advance the technology of direct coal fired integrated MHD power systems, to prove the technology and obtain the data necessary for scale up for industrial applications.[13]

LITERATURE REVIEW

A review of past and current literature dealing with the subject of government influence on service contracts did not produce any work or data on previous efforts in this area. The subjects of performance, efficiency, morale and organizational structure have not been researched for their interrelationship with respect to the influence of a Government contract or environment. However, a considerable amount of work has been done on each individual subject and, to a lesser extent, the relationship of each to organizational structure.

One of the most pertinent works applicable to this study was that of James C. Worthy of Sears, Roebuck and Company. In 1950 he reported that he had surveyed over 100,000 company employees for the "...purpose of finding out how well employees liked their job, what their attitudes were toward supervisors and management, and what factors in their employment might be contributing to dissatisfaction and poor working relationships."[14] He concluded that " f latter, less complex structures, with a maximum of administrative decentralization, tend to create a potential for improved attitudes, more effective supervision, and greater individual responsibility and initiative among employees".[15] Worthy's extensive empirical study and interpretation is still one of the works most cited favoring flat, organic organizations over tall, mechanistic types.

The Woodward Studies,[16] conducted by Joan Woodward and her research team in 1953 found " t here was a tendency for organic management systems to predominate in the productive categories at the extremes of the technical scale while mechanistic systems dominated at the middle ranges."[17] They also reported that organizations at the extremes of the technical scale exhibited a high degree of delegation of authority and responsibility for decision making, a tendency for job generalization instead of job specialization, and greater use of verbal in lieu of written communication.

A study done by Harrel Carpenter in 1971, of six public school systems examined the effect of organization on teacher job satisfaction. "He found that teachers in flat organizations perceived higher job satisfaction than teachers in medium and tall organizations."[18]

Leo Meltzer and James Salton [19] in 1962, surveyed 704 members of the American Physiological Society to examine the relationship between organization structure, performance, and job satisfaction. They reported that structure has a definite effect on job satisfaction, productivity, and morale. Additionally, they found a more mechanistic structure has a negative effect on these characteristics. Another interesting result of their study also examined the differences in job satisfaction between various institutions. The institutions examined were classified as academic, governmental, or industrial. All the institutions showed a decrease in job satisfaction as the organizational levels increased.

A 1964 Porter and Lawler study of managerial job satisfaction reported there was greater need satisfaction in flat organizations than tall. They also found that in companies of less than 5000 employees, managerial satisfaction was greater in flat than in tall organizations, but in organizations with greater than 5000 employees the results were reversed. An even more important finding was that "...a tall type of structure seems especially advantageous in producing security and social need satisfactions, whereas, a flat structure has superiority in influencing self-actualization satisfactions." [20]

The relationship of organizational structure to job performance, satisfaction, and anxiety-stress was examined by John Ivancevich and James Donnelly Jr. In a 1975 report, they concluded that "trade salesmen in the flat organizations perceived more self-actualization and autonomy satisfaction, reported significantly lower amounts of anxiety-stress, and performed more efficiently than salesmen in medium and tall organizations." [21] They also found that in the flat organization the individuals were not subject to a lot of domination by the supervisor and thus allowed to use their discretion, creativity, and ingenuity in doing their jobs. There was also an absence of strict adherence to rules and regulations. Some of the dissatisfiers identified by members of the medium and tall organizations were restrictions, stifling constraints, lack of trust, excessive controls, and the frequency of supervisory monitoring and intervention. The later was the most frequently cited dissatisfier.

The last work found through the literature search was that of Donald Pelz and Frank Andrews.[22] The authors administered questionnaires to 1461 scientists and engineers in several industrial laboratories, university defense-oriented institutes, government laboratories, and academic departments of large universities to determine the characteristics of productive climates for research and development. In 1966 they reported their conclusions and findings. The first conclusion reported was that of freedom in deciding methods to be used in accomplishing their work. They found that scientists and engineers in the laboratory environment were more satisfied and performed better when allowed substantial influence over their work and its accomplishment. The second conclusion was that open communication, within the laboratory, produced higher performance and satisfaction among the engineers and scientists. Diversity and some job generalization were also found to produce higher performance. The third result pertinent to this project dealt with morale. The study report concluded that highly motivated and intensely dedicated engineers and scientists within a laboratory environment exhibited a much higher morale.

In summary, research efforts since 1950 have indicated that flat, oreanic organizations have produced higher performance, morale, and efficiency among its educated, professional employees. It has also been shown that determining the existence of certain dissatisfiers and characteristics such as authority and decision making responsibility, channels of communication, organizational size, levels in the organizational hierarchy, and individual freedom in job performance can predict the job satisfaction, performance, morale, and efficiency of the organization's employees.

In the course of conducting this review several studies were found that presented findings and conclusions contradicting those cited previously. Two of the more plausible, widely accepted explanations for the disparity in results stem from observations made by the team of John Child and Roger Mansfield and the team of Porter and Lawler. Child and Mansfield stated "...that the dispute... derives largely from the fact that they have been studying different facets of organizations."[23] Porter and Lawler stated ",,,that large and small social organizations may require somewhat different shapes of structure in order to function effectively."[24] It is also interesting to note that no two organizations, nor the people studied,

were exactly the same. Another conclusion found in almost all of the studies, pro and con, in this area is that a multivariate dimensional approach considering all variables, complex or simple and known or identified as organizational characteristics, needs to be undertaken.

RESEARCH INSTRUMENT

BACKGROUND

The survey was attitudinal consisting of 35 questions. Each question was designed to determine how the employee felt, their attitudes and perceptions about the organization and the morale, performance, and efficiency of their work group and themselves. Group was defined as all the persons who report to the same supervisor.

The answers to the questions were used to determine the attitude of the Engineers, Engineering Assistants and Draftsmen of each company and in turn determine the overall climate or "take the temperature of the organization."[25] Employee attitudes are well suited for this purpose since the Hawthorne Studies, 1927 to 1933, "demonstrated the importance of employee attitudes and preoccupations,"[26] and "emphasized the importance of group processes to employee attitudes and productivity."[27] It also showed that employee attitudes and morale appeared to be major determinants of productivity, and that a variety of factors "...influenced his attitudes and morale."[28] Almost every organizational study since that time has examined the attitudes present in the organization in order to gain insight into its health and functioning.

Questions 1 through 4 asked for personnel data. Question 1 was used to determine if the respondent was from AEDC or UTSI. Question 2 allowed the respondents to describe their job. A list of job titles to choose from was not provided because the respondents may not have felt they fit into one of the listed catagories. This also allowed persons not working in high technology to be identified. Questions 3 and 4 were asked for thoroughness only and not for correlation in the analysis. However, the responses to these questions might be analyzed with the data at a future date.

Questions 5 and 6 were posed to determine the perception the employees had of the structure of their organization. The responses will be compared and analyzed against the formal, published company organizational structure.

Mr J. P. Campbell[29] identified and defined a number of single-criterion measures for determining organization effectivness. One criterion identified as useful was flexibility or adaptation. Mr. Campbell's definition of this criterion was used as the basis for question 7. Responses to this question will indicate if the organization is structured to allow it to respond well in a technical environment.

The next five questions were taken from the Organizational Assessment Package compiled by the Air Force Leadership and Management Development Center.[30] The package lists questions proven suitable for use in organizational questionnaires. Questions 8,9,10,11, and 12 were chosen from this package because they have been found to be good

indicators of the perceived productivity and group effectiveness. Questions 8 and 9 specifically asked for the respondents perception of the quality and quantity, respectively, of the groups' work. Questions 10, 11, and 12 determined the employees perception of the efficiency of the work group.

The employees perception of the existence of organizational characteristics that have been classified by Burns and Stalker [31] as either organic or mechanistic were determined by questions 13, 15, 17 and 19. Burns and Stalker identified the lack of an organization chart, the absence of a lot of rules and regulations, and the adjustment and continued redefinition of individual tasks through interaction with others as characteristics of organic organizations. These characteristics were found to be conducive of high employee performance in companies working in an unpredictable environment.

Burns and Stalker [32] and Katz and Kahn [33] identified communication within an organization as an indicator of efficiency, higher morale, and company performance. They found that companies benefited when organizations dealing with highly complex, technical problems kept communication open and unrestricted. Questions 14, 16, 18, and 20 were posed to the respondents to get an indication of the freedom and direction of communication within the organization.

Question 21, developed from Likert's System 4 study and Burns and Stalker's management system characteristics, was used to indicate the employees perception of involvement in decision making. Involvement in the decision making process is a characteristic of organic structures.

Question 22 asked the respondent to classify their organizational environment as predictable or unpredictable. In the predictable environment, the organizational structure can be characteristically organic or mechanistic and still function acceptably. However, Burns and Stalker [34] concluded from their study that the more unpredictable the environment the more functionally suitable an organic structure is for the organization.

The objective of questions 23 and 24 was to determine organizational factors perceived by the respondent as dissatisfiers. Question 23 asked for the primary job dissatisfier. Question 24 asked the respondent to rank, in order, four factors that previous studies have identified as dissatisfiers.

Questions 25, 26, 27, 28, and 29 asked for the respondent's perception of freedom to perform in the job and characteristics that influence that performance. Questions 25, 26 and 27 were formulated from questions used in the Leadership Development Management Package Survey Guide [35] and questions 28 and 29 were taken from the Federal Employee Attitude Survey Final Report.[36]

Questions 30, 31, 32, and 33 of the survey were taken from the questionnaire of Taylor and Bowers.[37] Taylor and Bowers found these four questions to be good indicators of individual and organizational

morale. Kimmel and O'Mara, in their study "The Measurement of Morale", used the same four questions and concluded "that morale represents an effective orientation toward the work unit or organization and includes job satisfaction as one of its major components."[38] By determining the satisfaction of the employee with the job, organization, supervision, and peers, and analyzing them collectively, one can determine the overall morale of the individual and on a larger scale the organization.

The last two questions, numbers 34 and 35, were asked in order to obtain information on the length of time the survey recipients had worked in their technical field and with their current employer. Three years ago the Air Force split the service contract between three contractors. Prior to this time, it had been exclusively granted to Sverdrup. The data from these questions might have helped account for any bias toward total dissatisfaction.

QUESTIONS

The survey questions, as they were administered in the validation effort, are here presented in numerical order. After the validation run, some of the survey questions were altered prior to their inclusion in the survey questionnaire for the study. The changes to the questions are provided and explained in the SURVEY FINALIZATION section.

1. Location you work: AEDC UTSI

2. Occupation: _____

3. Degree: Doctorate Master's Bachelor's High School Other

4. Sex: Male Female

5. Levels of supervision between you and the general manager: 1 2 3 4 5 6 7 8 9 10

6. My organizational structure is: Line-Staff Matrix Other

7. My company is organized to allow the timely mobilization of resources (personnel and/or material) to adaquately accomplish the job:

8. The quantity of output of my work group is very high:

9. The quality of output of my work is very high:

10. When high priority work arises, such as short suspenses, crash programs and schedule changes, the people in my work group do an outstanding job in handling these situations:

11. My work group gets maximum output from available resources (e.g., personnel and material):

12. My work group's performance in comparison to similar work groups is very high:

13. My group has a well defined and understood organization chart:

14. I am encouraged to communicate with others (peers and supervisors) outside my group in accomplishing my job:

15. A lot of rules and regulations are imposed on my group and me in performing our job:

16. I am permitted to appeal disciplinary actions to higher organizational levels:

17. Control, authority and communication are initiated at the top of the organization and closely follow the hierarchy of the organization chart downward:

18. Employee suggestions and recommendations for organizational improvement are transmitted up the organization for discussion and action:

19. My rights, obligations and technical methods used in the performance of my job are precisely defined:

20. Communications within the company predominantly consists of information and advice rather than instructions and mandates:

21. Except in emergencies, goals are usually established by means of group participation:

22. The environment I work in is certain, predictable and changes slowly if any:

23. Performance of my job is negatively influenced predominantly by: Supervisor Rules and Regulations Organization Structure Peers

24. Please rank order, 1-4, the following as negative influences on your job (1 being the most negative influence and 4 being the least negative influence): Supervisor Rules and Regulations Organizational Structure Peers

25. I am allowed to use whatever means I want to do my job:

26. I am able to perform to the best of my ability in my job:

27. I am very satisfied with my job performance:

28. I don't have enough work to do to keep me busy:

29. I have too much work to do everything well:

30. All in all, I am satisfied with my job:

31. All in all, I am satisfied with the persons in my work group:

32. All in all, I am satisfied with my supervisor:

33. All in all, I am satisfied with the organization of the company:

34. I have worked in engineering or applied technology ____ years

35. I have been with this organization___ years.

SCORING

The survey questions were worded so that the participants' responses could be easily quantified. Questions that had only a finite number of answers, such as those asking for biographical data, listed all the possibilities.

Questions asking the participants to respond based upon perception or feelings required marking a five division scale from disagree to agree. The scale was divided into blocks labeled from the left, Disagree, Slightly Disagree, Neutral, Slightly Agree and Agree.

Each possible answer was then assigned a number from one to five so it could be processed by the computer codes listed in the Appendixes. Appendix A provides the code used for analyzing the data, and Appendix B provides the code used for determining the distribution of the data.

The choices were numbered numerically starting with the far left answer. The larger the numerical result for the survey attitudinal questions the more organic the characteristic is perceived to be. Conversely, the lower the numerical result the more mechanistic it is perceived to be.

Five questions; numbers 13, 15, 17,19 and 22; were reversal type questions. Responses agreeing with these questions indicated mechanistic characteristics of the organization. Therefore, the response scales for them were numbered numerically from one to five starting from the right. By doing this, the numerical results to these questions could be directly compared to the others in the questionnaire.

VALIDATION

APPROACH

The survey questions, shown in the preceding section, were validated by administering them in questionnaire form to the members of an organization where the structure, morale, performance and efficiency were known from personal experience and contact. The survey participants consisted of seven engineers (having at least a bachelor's degree in an engineering discipline), one technical assistant (having completed high school or obtaining an Associate Degree in some engineering discipline) and one secretary. The secretary was chosen to check that the computer codes for the survey analysis would properly disregard unwanted survey responses. No draftsmen were included in the validation check because there were none authorized for that component of the organization.

RESULTS

Organization Structure - Since the group in which the questionnaire was validated was part of a bureaucratic, line-staff organization, the mean of questions 13, 15, 17, 19 and 21 should have been less than 3. A mean of 2.8 for these questions was obtained.

Table 1 ORGANIZATION QUESTION RESPONSES

QUESTION	AGREE	DISAGREE	CHARACTERISTIC
13	57%	14%	mechanistic
15	71%	14%	mechanistic
17	30%	30%	neutral
19	29%	71%	organic
21	29%	43%	slightly organic

Looking at the responses to the individual questions, Table 1, they indicate the perceived existence by the respondents of a firm organization chart and a lot of rules and regulations (questions 13 and 15 respectively). They also show the survey group was split or undecided on the degree of adherence to the organization hierarchy in day to day operations (question 17). The answers also indicate the individuals within the group are allowed to decide how best to perform their work and are included, to a certain extent, in the goal development process (questions 19 and 21 respectively). Percentages and data for responses marked in the neutral block of the questions is not reported. They may be calculated by subtracting the total of the percentage scores from 1.0 or subtracting the total of the responses, when shown in the table, from the total number of responses from the group.

These results are very representative of the group because, although it is mechanistic in character with a line-staff structure, the managers within advocate an open door policy, a strong sense of cooperation, confidence and trust in the capabilities of the individuals.

Performance - The performance of the organization was found to be above average with the mean of questions 25, 26 and 27 being 4.0. The percentage of responses that agreed or disagreed are shown in Table 2.

Table 2 ORGANIZATION PERFORMANCE RESPONSES

QUESTION	AGREE	DISAGREE
25	86%	14%
26	71%	0%
27	100%	0%

As mentioned earlier, the individuals of the survey's validation group were allowed to decide how best to do their work with little, if any, supervisory interference. The respondents verified this point with their responses to Question 23, the predominant negative job influence. Of the four options for this question, seventy-one percent of the respondents chose Organization Structure, and twenty-nine percent chose Rules and Regulations. No one chose the Supervisor or Peers options. This freedom in job performance might explain the unanimous response to Question 27, satisfaction with self performance.

Efficiency - The efficiency of the group was also rated above average. The mean of the responses to questions 10, 11 and 12 was 4.2. The percentage of responses agreeing and disagreeing are provided in Table 3.

Table 3 EFFICIENCY QUESTION RESPONSES

QUESTION	AGREE	DISAGREE
10	86%	0%
11	86%	0%
12	100%	0%

The responses to these questions are very representative of the group. Questions 8 , 9, 28, and 29, on their work quality , quantity and workload confirm these findings. Eighty-six percent of the participants agreed that the quality and quantity of their work group was very high.

Morale - The mean of the morale questions, numbers 30, 31, 32 and 33 was 3.9. Although this was above average it should have been expected, since performance and efficiency had above average means. The reasons cited earlier, lack of close supervision, freedom to work as they see fit, the existence of organic characteristics, and satisfaction with job performance all play a part in determining the morale within the organization. The response percentages to each question are provided in Table 4.

Table 4 MORALE QUESTION RESPONSES

QUESTION	AGREE	DISAGREE
30	57%	29%
31	71%	14%
32	100%	0%
13	57%	29%

The lower responses to questions 30 and 33, satisfaction with job, and satisfaction with organization, resulted in a lower overall morale score. The reason for the dissatisfaction with the job cannot be readily explained from the data of the survey. However, discussion with some of the individuals in the group indicated their dissatisfaction was due to duties other than their primary ones. The lower response to question 33 should have been expected since the organization was identified as the principle dissatisfier.

SURVEY FINALIZATION

The survey validation exercise revealed the need to reword some of the questions to improve understanding and remove some biases. Specifically, questions 5, 16, 25 and 26 were altered before the survey was finalized for distribution.

The validation exercise participants reported they were unsure if their answer to question 5 included themselves and the general manager or just themselves. The question was clarified by adding the word "inclusive" at the end of the sentence:

The survey participants were also unsure what question 16 was asking. They were not sure to answer it from their viewpoint or from the organization viewpoint. This problem was remedied by replacing "I am permitted" with "My company promotes".

Question 25 was considered by most of the validation participants as biased toward a negative answer and recommended it be altered to read "I am allowed to use whatever means, within reason, that I want to do my job:". This change was made in the finalized questionnaire.

Question 26 was considered to be bias toward a positive answer so question 25 was changed to read "I am free..." instead of "I am able...".

CONCLUSION

Overall, the survey did an excellent job of characterizing and describing the survey validation group. The results were shown to and discussed with the respondents and they agreed the results were indicative of their organization.

With the exception of a few changes in question wording for clarification and to eliminate bias, the survey as written and composed was determined to be a good tool for determining the structure, performance, efficiency and morale of the organizations to be studied.

The technical assistant and secretary were identified and correctly categorized by the computer codes. The engineers were all correctly identified and their data processed.

ORGANIZATION SELECTION

After validation, the survey was administered to randomly selected engineers, engineering assistants, and draftsmen from the three AEDC operating contractors and the CFFF operating contractor. These groups were chosen because the survey was intended to assess the attitude of persons who worked with high technology efforts. Engineers were those who had obtained a bachelor's degree in some engineering discipline. No attempt was made for a finer distinction between disciplines because the purposes of this study required only looking at the engineers as a whole entity. The engineering assistants group was composed of individuals who had earned an associate degree in engineering or had worked in the technical and engineering field sufficient time to be classified as such.

Classification was used to determine the population from which the survey sample was taken. At AEDC, the workers were classified as Nonexempt or Exempt, with wage employees and those with limited experience in their profession classified as Nonexempt. Employees considered Exempt were those with college degrees or with enough experience to be considered professional. The years of experience necessary to be considered Exempt vary from job to job, but are essentially standard among the three contractors. Only the Exempt employees of each of the three AEDC operating contractors were chosen for the survey population since they were considered to have a professional status. All of the CFFF engineers, engineering assistants, and draftsmen were chosen for the study, because they were all classified as Exempt by the organization and were relatively fewer in number.

The sample size chosen from the population for each organization is shown in Table 5. Costs and time prohibited surveying every individual in each organization, but in no case was the sample size allowed to be lower than twenty percent of the survey population. Twenty percent was considered acceptable since it was five percent greater than the minimum of fifteen percent recommended by Taylor and Bowers[39]. The minimum twenty percent sample size also provided a more equal sample representation from each of the three AEDC operating contractors.

Table 5 SURVEY POPULATION AND SAMPLES

	ENG		ENG ASSIST		DRAFT	
	pop	samp	pop	samp	pop	samp
SVT	383	76	51	20	20	10
CAL	339	67	38	13	12	10
PAN	62	62	31	31	8	8
CFFF	32	32	6	6	7	7

RESULTS AND ANALYSIS

In all, 342 surveys were sent to the randomly selected participants. Of this 342, CFFF was sent 45; Sverdrup was sent 106; Calspan,90, and Pan-Am, 101. Out of the 342 surveys seventy percent, or 240, were returned. The distribution is shown in Table 6.

Table 6 SURVEY DISTRIBUTION

	ENG			ENG ASSIST			DRAFT		
	out	in	%	out	in	%	out	in	%
CFFF	32	29	91	6	6	100	7	2	29
AEDC	205	150	73	64	35	55	28	18	64

A return percentage less than 50% was not considered statistically representative for gauging the attitudes of that group of the organization. In this case the responses are presented for completeness only and not as an indicator of an organizational characteristic. Only one of the organization groups fell into this category: the CFFF draftsmen.

Organization Structure - Discussions with the personnel managers for the three AEDC contractors revealed that Sverdrup was structured in a matrix or modified matrix style while Calspan and Pan-Am were structured in the classical line-staff style. The CFFF personnel manager also described their structure as classical line-staff. Question 6 on the survey form asked the participants to indicate their perception of the organizational structure, Line-staff, Matrix or Other. The third catagory, Other, was added for those that did not know their structure or did not understand the classifications. Line-staff was assigned a one, Matrix a two, and Other a three, in scoring the survey. The results are presented in Table 7.

Table 7 PERCEIVED ORGANIZATIONAL STRUCTURE

	ENG			ENG ASSIST			DRAFT		
	avg	line	matrix	avg	line	matrix	avg	line	matrix
CFFF	1.1	26	2	1.2	5	1	2.0	0	1
AEDC	1.6	81	52	1.5	20	12	1.6	8	8

To better understand the tendency for characteristics of the organization to be organic or mechanistic, questions 13, 15, 17, 19, and 21 had the survey participants answer questions about the existence of an organization chart, the number of rules and regulations affecting their work, adherence to the organization chart in day to day operations, freedom to choose work methods, and participation in goal setting, respectively. The responses, by group and question, are provided in Tables 8, 9 and 10 below. In scoring,

the lower the average response the more mechanistic the characteristic tends to be, and the higher the response the more organic the characteristic tends to be. Question 13, 15, 17, and 19 were reversal type questions and were thus scored backwards.

Table 8 PERFORMANCE QUESTION RESPONSES

		ENGINEERS				
QUESTION 13	avg	1	2	3	4	5
CFFF	1.7	16	9	2	1	1
AEDC	2.2	63	31	25	15	15
QUESTION 15						
CFFF	3.4	3	3	9	7	7
AEDC	1.9	77	42	11	11	8
QUESTION 17						
CFFF	3.2	4	3	10	7	5
AEDC	2.7	34	36	38	24	17
QUESTION 19						
CFFF	3.4	3	7	2	9	8
AEDC	3.2	11	41	38	29	30
QUESTION 21						
CFFF	3.6	1	7	2	10	9
AEDC	2.8	32	40	22	34	21

Table 9 PERFORMANCE QUESTION RESPONSES

		ENGINEER ASSISTANTS				
QUESTION 13	avg	1	2	3	4	5
CFFF	1.7	4	0	2	0	0
AEDC	2.3	15	7	3	7	3
QUESTION 15						
CFFF	2.2	2	2	1	1	0
AEDC	2.0	19	6	3	4	3
QUESTION 17						
CFFF	2.7	3	0	1	0	2
AEDC	2.7	10	7	6	6	6
QUESTION 19						
CFFF	3.3	1	1	1	1	2
AEDC	2.8	7	12	4	4	8
QUESTION 21						
CFFF	3.3	3	0	1	0	2
AEDC	2.8	8	6	2	8	11

Table 10 PERFORMANCE QUESTION RESPONSES

			DRAFTSMEN				
QUESTION 13		avg	1	2	3	4	5
	CFFF	2.5	1	0	0	1	0
	AEDC	2.0	11	1	3	1	2
QUESTION 15							
	CFFF	3.0	1	0	0	0	1
	AEDC	1.7	10	5	2	0	1
QUESTION 17							
	CFFF	3.0	0	0	2	0	0
	AEDC	2.1	9	2	4	1	2
QUESTION 19							
	CFFF	2.5	0	1	1	0	0
	AEDC	2.8	3	8	1	2	4
QUESTION 21							
	CFFF	3.0	0	0	2	0	0
	AEDC	3.2	4	3	2	3	6

Averaging the results for questions 13, 15, 17, 19, and 21 can indicate an overall organizational tendency toward organic or mechanistic style characteristics. These results are shown in Table 11 below.

Table 11 ORGANIZATIONAL CHARACTERISTIC AVERAGES

	ENG	ENG ASSIST	DRAFT
CFFF	3.1	2.6	2.8
AEDC	2.5	2.5	2.4

Table 12 STYLE CHARACTERISTICS

	ENG		ENG ASSIST		DRAFT	
	ORG	MECH	ORG	MECH	ORG	MECH
CFFF	4	1	2	3	-	-
AEDC	1	4	0	5	1	4

The base contractors were expected to have a tendency for mechanistic characteristics, and indeed, that is what was found. The AEDC contractors' organizational characteristic responses were all below average and tended to be more mechanistic as compared to the results of corresponding CFFF groups. However, the groups of both organizations perceived themselves in line-staff structures. Despite the organizational structure, individual organizational characteristics were found to be the determinants of the overall organizational character. This can be seen by looking at the number of characteristics perceived as organic or mechanistic and the overall

average of the organizational characteristics, Tables 12 and 13 respectively.

Looking at the number of management levels versus people supervised, Table 13, the CFFF appeared to be the tallest, followed by Sverdrup, then PAN AM, and then Calspan. It needs to be pointed out that although the CFFF organizational chart shows 5 levels the majority of the people are at the bottom level and the structure rapidly narrows after the bottom two levels. Based upon examination of the organizational charts the base had overall flatter organizations than the CFFF.

Table 13 ORGANIZATIONAL STRUCTURE

	EMPLOYEES	SUPERVISOR LEVELS	TALLNESS RANKING
CFFF	123	5	1
SVT	1070	5	2
CAL	1320	4	4
PAN	981	4	3

This study found a case where the tallest organization, with a line-staff structure, tended to have characteristics representative of an organic organization. The effect of these organizational characteristics and tendencies on the performance, efficiency and morale will be examined next.

Performance - The performance average scores of the contractors at AEDC and the contractor at the CFFF were found to be above average. In answering questions 26, 27 and 28 the participants perceived a great deal of freedom to do their job the way they saw fit and were very satisfied with their current performance. Survey responses from the CFFF and AEDC participants are shown in Table 14.

Table 14 PERFORMANCE QUESTION RESPONSE

	ENG			ENG ASSIST			DRAFT		
	AVG	POS	NEG	AVG	POS	NEG	AVG	POS	NEG
CFFF	4.1	78%	8%	4.7	100%	6%	4.5	100%	0
AEDC	3.8	69%	19%	4.0	79%	17%	4.1	81%	9%

The responses to questions 28 and 29 indicated their work load to be just about right. The participants responses to these questions are presented in Table 15.

Table 15 WORKLOAD QUESTION AVERAGES

		ENG	ENG ASSIST	DRAFT
QUESTION 28	CFFF	1.8	1.4	2.0
	AEDC	1.6	1.6	2.4
QUESTION 29	CFFF	3.3	2.9	1.5
	AEDC	3.2	2.8	2.6

The CFFF score averages were significantly above those of the AEDC contractors. To try and explain this difference, the primary

dissatisfier, and worker absence due to sickness were examined for each contractor. The AEDC contractor participants' responses to question 23 solidly identified rules and regulations as the primary dissatisfier whereas the CFFF participants identified organizational structure.

Discussing this finding with some of the AEDC supervisors of the groups surveyed, the predominant complaint cited by the group members was that they felt "tied by red tape" in trying to do their job. The supervisors also stated that the Air Force rules and regulations did not, in many cases, apply to the task being performed and thus caused a lot of wasted time trying to make the situation fit the rules. They also stated that a lot of the company rules were perceived as the result of Air Force rules and regulations, and as such were often perceived more restrictive than required.

In discussing the predominant dissatisfier found for the CFFF survey participants with the CFFF personnel manager, it was found that the employees of the facility were frustrated because there was no perceived firm, permanent organization structure. The facility, being relatively new and funded on a year to year basis, made the employees feel insecure.

According to Mazlow [40], this desire for permanency and security might motivate the employees to perform better. However, Vroom's theory "that motivation is a function of both a person's ability to accomplish the task, and (their) desire to do so," [41] cautions that although the valence for the outcome is present, the expectancy for the desired outcome must also be present. In this case it was not evident that the CFFF employees expected things to change, and in some they seemed unsure about the outcome of greater performance. The survey data gave no indication which theory might prevail.

Herzberg's theory of job satisfaction [42] proposes that when people like doing something they do better at it, thus employees who like their job should perform better. One indicator of job satisfaction identified by the Personnel Managers of the contractors was absenteeism, so the indicator chosen for examination was sick leave. The average sick leave absence ratio, total sick leave hours divided by total possible work hours, for the three base operating contractors was .020. The CFFF employees had a ratio of .020 and from this, it was concluded that either there was the same amount of job satisfaction among the survey participants in both organizations, or that sick leave is not a good indicator in this case. The latter was found more correct as the analysis of the morale questions showed.

Efficiency - There was little difference found in the efficiency score averages of both organizations. The score averages and percentages of participants that agreed (AGR) and disagreed (DIS) are shown in Table 16.

Table 16 EFFICIENCY AVERAGES AND RESPONSES

	ENG			ENG ASSIST			DRAFT		
	AVG	AGR	DIS	AVG	AGR	DIS	AVG	AGR	DIS
CFFF	3.9	65%	13%	4.4	78%	5%	3.7	50%	17%
AEDC	4.0	74%	11%	4.1	75%	14%	4.4	85%	5%

The average was calculated by adding the responses to questions 10, 11 and 12 and dividing them by three times the total surveys for the identified groups. It was interesting to note that in almost all cases question 10 received the highest scores, question 12 next, and then question 11. The respondents' answers indicated they were well satisfied with their work group.

Backing up these results were the above average scores for the communication questions 14, 18, and 20 and the efficiency question, number 7. The results shown in Table 17, show a great deal of openness in communication within the CFFF and AEDC groups. The respondents rated question 14 the highest, followed by 20 and then 10. Free and open communication has been found to foster higher organization effectiveness and efficiency.[43]

Table 17 COMMUNICATION AND EFFECTIVENESS RESULTS

	ENG	ENG ASSIST	DRAFT
COMMUNICATION			
CFFF	3.7	4.5	4.3
AEDC	3.3	3.4	3.8
EFFECTIVENESS			
CFFF	3.4	4.0	2.5
AEDC	3.2	3.5	3.9

Morale - The averages for the morale questions are shown in Table 18. These averages were determined by adding all the response scores for questions 30, 31, 32 and 33 together and dividing them by four times the number of surveys responding from the group.

Table 18 MORALE SCORE AVERAGES

	ENG			ENG ASSIST			DRAFT		
	AVG	AGR	DIS	AVG	AGR	DIS	AVG	AGR	DIS
CFFF	4.0	74%	14%	4.4	83%	12%	3.1	37%	25%
AEDC	3.8	67%	20%	3.9	72%	16%	4.1	79%	15%

Despite having the perception of the tallest and most mechanistic structure, the CFFF had the highest overall morale of all the contractors surveyed. Morale was measured from responses to questions on satisfaction with job, work group, supervisor and organization structure, and as such provided a good correlation for the previously mentioned characteristics.

One can see from Table 19 the high degree of satisfaction with job, work group and supervision. The score for satisfaction with the organization structure was noticably lower than the other scores in both the responses from the CFFF and the AEDC groups.

Table 19 INDIVIDUAL MORALE RESPONSES

CFFF

	ENG	ENG ASSIST	DRAFT
Question 30	4.1	4.8	3.5
Question 31	4.3	4.3	3.0
Question 32	4.2	4.5	3.0
Question 33	3.0	3.5	3.0

AEDC

	ENG	ENG ASSIST	DRAFT
Question 30	3.8	3.9	4.2
Question 31	4.2	4.1	4.3
Question 32	4.0	3.8	4.2
Question 33	3.0	3.6	3.5

A lack of satisfaction with the CFFF organization was expected in light of the fact that organizational structure was the primary negative influence. To explain the lower organization satisfaction scores for the AEDC organizations, the response to question 24 was examined. This showed that organization structure was rated the second most predominant negative influence on the work group. Discussions with some of the supervisors and work group employees revealed dissatisfaction with the organizational structure of the Center and in particular the relationship between the contractors, instead of with the work group's organization. This point indicates that the survey results are potentially attributable in some part to feelings of resentment over the contract split.

CONCLUSIONS

The results of the survey indicate some degree of difference between the characteristics of the AEDC and the CFFF contractor's organizations. Considering both are providing services to the Government, and all Government service contracts are essentially governed by the same contract laws and regulations, the differences must be due to the individuals employed there and/or the environment.

Overall, the data indicates that the CFFF technical personnel perceived themselves as performing and communicating to a slightly higher degree than the contractor's technical personnel at the base. The analysis also indicates a slight tendency for the CFFF facility to have a higher job performance and subsequently higher morale. These results, in total, suggest that overall, the CFFF employees are more satisfied with their jobs.

The only characteristic that appeared to be unaffected by any other organizational characteristic or outside influence was efficiency. Both organizations perceived and rated their efficiency as high. However, no data was gathered to determine the validity of their perceptions or the actual group efficiencies.

One organizational characteristic not accounted for in this study was the influence of the informal organization on the overall organizational performance. Most studies on this topic conclude "...that group size and cohesiveness are inversely related, and smaller groups should foster more satisfaction than larger ones...."[44] However, for all studies in this area the findings are mixed, indicating that other organizational characteristics, to some extent, determine the magnitude of its influence. Although some of the results of this survey could be attributable to the influence of the informal organization, there was no conclusive evidence to support or deny this conclusion.

This study did not corroborate the structure, satisfaction relationships proposed by the authors cited in the literature review section because both organizations were found to have mechanistic structures. In fact, the organization perceived to be the most mechanistic, the CFFF, exhibited more organic characteristics. The conclusion from this finding is that organization structure alone should not be used to stereotype the subject organization, but should be coupled with other indicators; such as performance, morale, communication, effectiveness, ect...; in order to obtain an accurate picture of the character of the organization. In this case it would have led to conclusions that would have been far from right. It is apparent that organizations can be structured mechanistically and yet have individual characteristics such as good communication, freedom in performance and participation in goal setting that overcome the negative effects that come with a mechanistic structure.

The results of this study also indicate that Child and Mansfield's finding that results often depend on the facet of the organization being examined is correct. In our case there are some differences between the survey groups within the same organization. There were noticable differences between these groups in their response to the performance, efficiency and effectiveness questions.

The study results, to a small extent, support that part of the hypothesis that the Government at AEDC does effect the performance of the contractor. From the respondents survey answers it appears that this is done by the imposition of numerous rules and regulations. It was also found through discussions and interviews that the numbers of regulations do not seem as important as the strictness with which they are enforced and their applicability to the situation.

The study results contradict the part of the study hypothesis that the Government rules and regulations influence the organizational structure which, in turn, affects the performance, efficiency and morale of the employees working with high technology. The influence of the number of rules and regulation does not effect organiztion characteristics through the structure, but instead influences them directly.

RECOMMENDATIONS

This study seems to shed light on a little researched area in management but its results are by no means absolutely conclusive. The study analysis has only considered the indications and trends from the raw data. No rigid statistical analysis has been performed, but must be before the findings and conclusions can be considered significant and truly conclusive. Further study must be done in order to better determine the influence of Government contract administration. It is therefore recommended that the study be redone within three years to determine if the results were in whole or part a byproduct of the split of the AEDC service contract from one to three contractors. It will also provide an indication of the success of the recent AEDC effort to eliminate some of the rules and regulations imposed by the contract.

It is also recommended that the survey be readministered to the draftsmen at the CFFF since no conclusions could be drawn due to insufficient sample return.

The last recommendation to be made is actually an extension of the first and that is to execute the survey at nongovernment companies providing or working in high technology environments to see how these results compare. This would be an important part of proving the general applicability of these results.

ENDNOTES

1. Office of Public Affairs, Arnold Engineering Development Center, (Arnold Air Force Station, Tennessee: United States Air Force Systems Command), p. 3.

2. Ibid., p. 3.

3. Ibid., p. 3.

4. Ibid., p. 3.

5. Ibid., p. 3.

6. Ibid., p. 10.

7. Charles R. Nelson, et al., Analysis of ASTF Support Branch (paper presented to the University of Tennessee Space Institute class on Structure, Organization and Control of the Enterprize, Tullahoma, Tenn., May 1983), pp. 7-8.

8. Gary Dessler, Organization Theory: Integrating Structure and Behavior, (New Jersey: Prentice Hall, 1980), pp. 25-26

9, Ibid., p. 66.

10. Ibid., p. 64.

11. University of Tennessee Space Institute, Coal Fired Flow Facility, (Tullahoma, Tenn.: University of Tennessee Space Institute, 1983), p. 1.

12. University of Tennessee Space Institute, Energy Conversion Research and Development Programs, (Tullahoma, Tenn: University of Tennessee Space Institute, 1983), p. 1.

13. University of Tennessee Space Institute, Capability Profile of Energy Conversion Research and Development Programs, (Tullahoma, Tenn.: University of Tennessee Space Institute, May 1982), p. 1.

14. James C. Worthy, "Organization Structure and Employee Morale," American Sociological Review, Vol 15 (April 1959), p. 169.

15. Lyman W. Porter and Edward E. Lawler IV, "The Effects of 'Tall' Versus 'Flat' Organization Structures on Managerial Job Satisfaction, Personnel Psychology, Vol 17 (1964), p. 135.

16. Joan Woodward, Industrial Organization: Theory and Practice, (London: Oxford University Press, 1970).

17. Gary Dessler, Organization Theory: Integrating Structure and Behavior, (New Jersey: Prentice Hall, 1980), p. 71.

18. John M. Ivancevich and James H. Donnelly Jr., "Relation of Organization Structure to Job Satisfaction, Anxiety, Stress and Performance," Administrative Science Quarterly, Vol 20, (June 1975), p. 273.

19. Leo Meltzer and James Salter, "Organizational Structure and the Peformance and Job Satisfaction of Physiologist," American Sociological Review, Vol 27, (1962), pp. 351-362.

20, Lyman W. Porter and Edward E. Lawler IV, "The Effects of 'Tall' Versus 'Flat' Organizational Structures on Managerial Job Satisfaction," Personnel Phychology, Vol 17, (1964), p. 147.

21. John M. Ivancevich and James H. Donnelly Jr., "Relation of Organizational Structure to Job Satisfaction," Administrative Science Quarterly,Vol 20, (June 1975), p. 279.

22. Donald C. Pelz and Frank M. Andrews, Scientists in Organizations, (New York: John Wiley and Sons, 1966).

23. John Child and Roger Mansfield, "Technology, Size and Organization Structure", Sociology, Vol 6, (1972), p. 383.

24. Lyman W. Porter and Edward E. Lawler IV, "The Effects of 'Tall' Versus 'Flat' Organization Structures on Managerial Job Satisfaction," Personnel Psychology, Vol 17, (1964), p. 147.

25. James C. Worthy, "Organization Structure and Employee Morale," American Sociological Review, Vol 15, (April 1959), p. 170.

26. Gary Dessler, Organization Theory: Integrating Structure and Behavior, (New Jersey: Prentice Hall, 1980), p. 290.

27. Ibid., p. 289.

28. Ibid., p. 292.

29. Ibid., p. 395.

30. Organizational Assessment Package, (Maxwell AFB, Alabama: Air Force Air University Leadership and Management Development Center), p. 11.

31. Gary Dessler, Organization Theory: Integrating Structure and Behavior, (New Jersey: Prentice-Hall, 1980), p. 65.

32. Ibid., p. 91.

33. Ibid., p. 64.

34. Ibid., p. 65.

35. Organizational Assessment Package, (Maxwell AFB, Alabama: Air Force Air University Leadership and Management Development Center), pp. 3-7.

36. U. S. Department of the Air Force. Federal Employee Attitudes Phase I: Baseline Survey 1979, (Washington, D.C.: Government Printing Office,1979), p. 14.

37. James C. Taylor and David G. Bowers, Survey of Organizations, (Ann Arbor, Michigan: University of Michigan, 1974), p. 182.

38. Army Research Institute for the Behavioral and Social Sciences, Proceedings of the Annual Conference of Military Testing Associations (23rd), Vol 1 and Vol 2,(Arlington, VA: 1981), p. 670.

39. James C. Taylor and David G. Bowers, Survey of Organizations, (Ann Arbor, Michigan: University of Michigan, 1974), p. 40.

40. Gary Dessler, Organization Theory: Integrating Structure and Behavior, (New Jersey: Prentice-Hall, 1980), p. 178.

41. Ibid., p. 235.

42. Ibid., p. 180.

43. Ibid., p. 95.

44. Ibid., p. 306.

APPENDIXES

APPENDIX A

ANALYSIS CODE

```
10 REM DATA ANALYSIS PROGRAM
11 A1=0:B1=0:C1=0:D1=0:E1=0:F1=0:G1=0:H1=0:I1=0:J1=0
12 K1=0:L1=0:M1=0:N1=0:O1=0:P1=0:Q1=0:R1=0
13 S1=0:T1=0:U1=0:V1=0:W1=0:X1=0:Y1=0:Z1=0
15 A5=0:B5=0:C5=0:D5=0:E5=0:NC1=0:NU=0
17 OPEN4,4,2:CMD4
18 FOR DC = 1 TO 239
20 READ A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z,A2,B2,C2,D2,E2
22 NC1=NC1+1
30 IF A=4 THEN 70
40 GOTO 400
70 IF B=1 THEN 99
80 GOTO 400
99 NU=NU+1
103 REMPRINT NC1,NU
105 A1=A1+A
106 B1=B1+B
110 C1=C1+C
120 D1=D1+D
130 E1=E1+E
140 F1=F1+F
150 G1=G1+G
160 H1=H1+H
170 I1=I1+I
180 J1=J1+J
190 K1=K1+K
200 L1=L1+L
210 M1=M1+M
220 N1=N1+N
230 O1=O1+O
240 P1=P1+P
250 Q1=Q1+Q
260 R1=R1+R
270 S1=S1+S
280 T1=T1+T
290 U1=U1+U
300 V1=V1+V
310 W1=W1+W
320 X1=X1+X
330 Y1=Y1+Y
340 Z1=Z1+Z
350 A5=A5+A2
360 B5=B5+B2
370 C5=C5+C2
380 D5=D5+D2
390 E5=E5+E2
395 IF NC1=239 THEN 446
400 NEXT DC
444 A9=A1/NU
445 B9=B1/NU
446 CA=C1/NU:DA=D1/NU
450 EA=E1/NU:FA=F1/NU
460 GA=G1/NU
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470 HA=H1/NU: IA=I1/NU
480 JA=J1/NU: KA=K1/NU: LA=L1/NU: JKLA=(J1+K1+L1)/(NU*3)
490 MA=M1/NU: OA=O1/NU: PA=P1/NU: RA=R1/NU: TA=T1/NU
491 MOPRA=(M1+O1+P1+R1+T1)/(NU*5)
499 NA=N1/NU: QA=Q1/NU: SA=S1/NU: NQSA=(N1+Q1+S1)/(NU*3)
520 UA=U1/NU
530 VA=V1/NU
540 WA=W1/NU: XA=X1/NU: YA=Y1/NU: ZA=Z1/NU: AAA=A5/NU
541 WXYZAA=(W1+X1+Y1)/(NU*3)
551 BBA=B5/NU: CCA=C5/NU: DDA=D5/NU: EEA=E5/NU
552 BCDEE=(B5+C5+D5+E5)/(NU*4)
553 PRINT "A="A9,"B="B9
554 PRINT "SURVEYS CONSIDERED="NC1,"SURVEYS USED="NU
700 PRINT "Q3="CA,"Q4="DA
705 PRINT "Q5="EA,"Q6="FA
707 PRINT "Q7="GA
710 PRINT "Q8="HA,"Q9="IA
715 PRINT "Q10="JA,"Q11="KA,"Q12="LA
720 PRINT "Q13="MA,"Q15="OA,"Q17="PA,"Q19="RA,"Q21="TA
725 PRINT "Q14="NA,"Q18="QA,"Q20="SA
730 PRINT "Q22="UA
735 PRINT "Q23="VA
740 PRINT "Q25="WA,"Q26="XA,"Q27="YA
745 PRINT "Q28="ZA,"Q29="AAA
750 PRINT "Q30="BBA,"Q31="CCA,"Q32="DDA,"Q33="EEA
755 PRINT "EFFECTIVENESS, Q7="GA
760 PRINT "CHARACTERISTICS, Q13-21="MOPRA
765 PRINT "COMMUNICATION, Q14-20="NQSA
770 PRINT "EFFICIENCY, Q10-12="JKLA
775 PRINT "PERFORMANCE, Q25-27="WXYZAA
777 PRINT "DISSATISFIER, Q23="VA
780 PRINT "MORALE, Q30-33="BCDEE
806 PRINT#4:CLOSE4
810 END
811 DATA 2,1,2,1,5,1,4,4,4,4,4,4,4,5,2,3,4,3,4,5,1,2,5,5,3,1,4,5,5,4,3
812 DATA 4,1,2,1,3,1,3,4,4,4,3,5,1,3,2,5,2,4,2,2,4,3,3,2,4,1,4,4,3,5,2
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APPENDIX B

DISTRIBUTION CODE

```
10 REM DATA DISTRIBUTION PROGRAM
11 A0=0:A1=0:A2=0:A3=0:A4=0:B0=0:B1=0:B2=0:B3=0:B4=0:C0=0:C1=0:C2=0:C3=0:C4=0
12 D0=0:D1=0:D2=0:D3=0:D4=0:E0=0:E1=0:E2=0:E3=0:E4=0:F0=0:F1=0:F2=0:F3=0:F4=0
13 G0=0:G1=0:G2=0:G3=0:G4=0:H0=0:H1=0:H2=0:H3=0:H4=0:I0=0:I1=0:I2=0:I3=0:I4=0
15 J0=0:J1=0:J2=0:J3=0:J4=0:K0=0:K1=0:K2=0:K3=0:K4=0:L0=0:L1=0:L2=0:L3=0:L4=0
16 M0=0:M1=0:M2=0:M3=0:M4=0:N0=0:N1=0:N2=0:N3=0:N4=0:O0=0:O1=0:O2=0:O3=0:O4=0
17 P0=0:P1=0:P2=0:P3=0:P4=0:Q0=0:Q1=0:Q2=0:Q3=0:Q4=0:R0=0:R1=0:R2=0:R3=0:R4=0
18 S0=0:S1=0:S2=0:S3=0:S4=0:T0=0:T1=0:T2=0:T3=0:T4=0:U0=0:U1=0:U2=0:U3=0:U4=0
19 V0=0:V1=0:V2=0:V3=0:V4=0:W0=0:W1=0:W2=0:W3=0:W4=0:X0=0:X1=0:X2=0:X3=0:X4=0
20 Y0=0:Y1=0:Y2=0:Y3=0:Y4=0:Z0=0:Z1=0:Z2=0:Z3=0:Z4=0:A5=0:A6=0:A7=0:A8=0:A9=0
21 B5=0:B6=0:B7=0:B8=0:B9=0:C5=0:C6=0:C7=0:C8=0:C9=0:D5=0:D6=0:D7=0:D8=0:D9=0
22 E5=0:E6=0:E7=0:E8=0:E9=0:NC1=0:NU=0
23 ED=0:EF=0:EG=0:EH=0:EI=0:EJ=0:EK=0:EL=0:EM=0
25 OPEN4,4,2:CMD4
26 FOR DC = 1 TO 239
27 READ A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z,AA,BB,CC,DD,EE
29 NC1=NC1+1
30 IF A=1 THEN 32
31 GOTO 400
32 IF B=1 THEN 34
33 GOTO 400
34 NU=NU+1
40 REMPRINT NC1,NU
45 REMPRINT A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W,X,Y,Z,AA,BB,CC,DD,EE
70 IF E=1 THEN80
71 IF E=2 THEN81
72 IF E=3 THEN82
73 IF E=4 THEN83
74 IF E=5 THEN84
75 IF E=6 THEN85
76 IF E=7 THEN86
77 IF E=8 THEN87
78 IF E=9 THEN88
80 ED=ED+1:GOTO90
81 EF=EF+1:GOTO90
82 EG=EG+1:GOTO90
83 EH=EH+1:GOTO90
84 EI=EI+1:GOTO90
85 EJ=EJ+1:GOTO90
86 EK=EK+1:GOTO90
87 EL=EL+1:GOTO90
88 EM=EM+1:GOTO90
90 IF F=1 THEN93
91 IF F=2 THEN94
92 IF F=3 THEN95
93 F0=F0+1:GOTO110
94 F1=F1+1:GOTO110
95 F2=F2+1:GOTO110
110 IF G=1 THEN115
111 IF G=2 THEN116
112 IF G=3 THEN117
113 IF G=4 THEN118
114 IF G=5 THEN119
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115 G0=G0+1:GOTO120
116 G1=G1+1:GOTO120
117 G2=G2+1:GOTO120
118 G3=G3+1:GOTO120
119 G4=G4+1:GOTO120
120 IF H=1 THEN125
121 IF H=2 THEN126
122 IF H=3 THEN127
123 IF H=4 THEN128
124 IF H=5 THEN129
125 H0=H0+1:GOTO130
126 H1=H1+1:GOTO130
127 H2=H2+1:GOTO130
128 H3=H3+1:GOTO130
129 H4=H4+1:GOTO130
130 IF I=1 THEN135
131 IF I=2 THEN136
132 IF I=3 THEN137
133 IF I=4 THEN138
134 IF I=5 THEN139
135 I0=I0+1:GOTO140
136 I1=I1+1:GOTO140
137 I2=I2+1:GOTO140
138 I3=I3+1:GOTO140
139 I4=I4+1:GOTO140
140 IF J=1 THEN145
141 IF J=2 THEN146
142 IF J=3 THEN147
143 IF J=4 THEN148
144 IF J=5 THEN149
145 J0=J0+1:GOTO150
146 J1=J1+1:GOTO150
147 J2=J2+1:GOTO150
148 J3=J3+1:GOTO150
149 J4=J4+1:GOTO150
150 IF K=1 THEN155
151 IF K=2 THEN156
152 IF K=3 THEN157
153 IF K=4 THEN158
154 IF K=5 THEN159
155 K0=K0+1:GOTO160
156 K1=K1+1:GOTO160
157 K2=K2+1:GOTO160
158 K3=K3+1:GOTO160
159 K4=K4+1:GOTO160
160 IF L=1 THEN165
161 IF L=2 THEN166
162 IF L=3 THEN167
163 IF L=4 THEN168
164 IF L=5 THEN169
165 L0=L0+1:GOTO170
```

```
166 L1=L1+1:GOTO170
167 L2=L2+1:GOTO170
168 L3=L3+1:GOTO170
169 L4=L4+1:GOTO170
170 IF M=1 THEN175
171 IF M=2 THEN176
172 IF M=3 THEN177
173 IF M=4 THEN178
174 IF M=5 THEN179
175 M0=M0+1:GOTO180
176 M1=M1+1:GOTO180
177 M2=M2+1:GOTO180
178 M3=M3+1:GOTO180
179 M4=M4+1:GOTO180
180 IF N=1 THEN185
181 IF N=2 THEN186
182 IF N=3 THEN187
183 IF N=4 THEN188
184 IF N=5 THEN189
185 N0=N0+1:GOTO190
186 N1=N1+1:GOTO190
187 N2=N2+1:GOTO190
188 N3=N3+1:GOTO190
189 N4=N4+1:GOTO190
190 IF O=1 THEN195
191 IF O=2 THEN196
192 IF O=3 THEN197
193 IF O=4 THEN198
194 IF O=5 THEN199
195 O0=O0+1:GOTO200
196 O1=O1+1:GOTO200
197 O2=O2+1:GOTO200
198 O3=O3+1:GOTO200
199 O4=O4+1:GOTO200
200 IF P=1 THEN205
201 IF P=2 THEN206
202 IF P=3 THEN207
203 IF P=4 THEN208
204 IF P=5 THEN209
205 P0=P0+1:GOTO210
206 P1=P1+1:GOTO210
207 P2=P2+1:GOTO210
208 P3=P3+1:GOTO210
209 P4=P4+1:GOTO210
210 IF Q=1 THEN215
211 IF Q=2 THEN216
212 IF Q=3 THEN217
213 IF Q=4 THEN218
214 IF Q=5 THEN219
```

```
215 Q0=Q0+1:GOTO220
216 Q1=Q1+1:GOTO220
217 Q2=Q2+1:GOTO220
218 Q3=Q3+1:GOTO220
219 Q4=Q4+1:GOTO220
220 IF R=1 THEN225
221 IF R=2 THEN226
222 IF R=3 THEN227
223 IF R=4 THEN228
224 IF R=5 THEN229
225 R0=R0+1:GOTO230
226 R1=R1+1:GOTO230
227 R2=R2+1:GOTO230
228 R3=R3+1:GOTO230
229 R4=R4+1:GOTO230
230 IF S=1 THEN235
231 IF S=2 THEN236
232 IF S=3 THEN237
233 IF S=4 THEN238
234 IF S=5 THEN239
235 S0=S0+1:GOTO240
236 S1=S1+1:GOTO240
237 S2=S2+1:GOTO240
238 S3=S3+1:GOTO240
239 S4=S4+1:GOTO240
240 IF T=1 THEN245
241 IF T=2 THEN246
242 IF T=3 THEN247
243 IF T=4 THEN248
244 IF T=5 THEN249
245 T0=T0+1:GOTO250
246 T1=T1+1:GOTO250
247 T2=T2+1:GOTO250
248 T3=T3+1:GOTO250
249 T4=T4+1:GOTO250
250 IF U=1 THEN255
251 IF U=2 THEN256
252 IF U=3 THEN257
253 IF U=4 THEN258
254 IF U=5 THEN259
255 U0=U0+1:GOTO260
```

```
256 U1=U1+1:GOTO260
257 U2=U2+1:GOTO260
258 U3=U3+1:GOTO260
259 U4=U4+1:GOTO260
260 IF V=1 THEN265
261 IF V=2 THEN266
262 IF V=3 THEN267
263 IF V=4 THEN268
264 IF V=5 THEN269
265 V0=V0+1:GOTO270
266 V1=V1+1:GOTO270
267 V2=V2+1:GOTO270
268 V3=V3+1:GOTO270
269 V4=V4+1:GOTO270
270 IF W=1 THEN275
271 IF W=2 THEN276
272 IF W=3 THEN277
273 IF W=4 THEN278
274 IF W=5 THEN279
275 W0=W0+1:GOTO280
276 W1=W1+1:GOTO280
277 W2=W2+1:GOTO280
278 W3=W3+1:GOTO280
279 W4=W4+1:GOTO280
280 IF X=1 THEN285
281 IF X=2 THEN286
282 IF X=3 THEN287
283 IF X=4 THEN288
284 IF X=5 THEN289
285 X0=X0+1:GOTO290
286 X1=X1+1:GOTO290
287 X2=X2+1:GOTO290
288 X3=X3+1:GOTO290
289 X4=X4+1:GOTO290
290 IF Y=1 THEN295
291 IF Y=2 THEN296
292 IF Y=3 THEN297
293 IF Y=4 THEN298
294 IF Y=5 THEN299
295 Y0=Y0+1:GOTO300
296 Y1=Y1+1:GOTO300
297 Y2=Y2+1:GOTO300
298 Y3=Y3+1:GOTO300
299 Y4=Y4+1:GOTO300
300 IF Z=1 THEN305
301 IF Z=2 THEN306
302 IF Z=3 THEN307
303 IF Z=4 THEN308
304 IF Z=5 THEN309
```

```
305 Z0=Z0+1:GOTO310
306 Z1=Z1+1:GOTO310
307 Z2=Z2+1:GOTO310
308 Z3=Z3+1:GOTO310
309 Z4=Z4+1:GOTO310
310 IF AA=1 THEN315
311 IF AA=2 THEN316
312 IF AA=3 THEN317
313 IF AA=4 THEN318
314 IF AA=5 THEN319
315 A5=A5+1:GOTO320
316 A6=A6+1:GOTO320
317 A7=A7+1:GOTO320
318 A8=A8+1:GOTO320
319 A9=A9+1:GOTO320
320 IF BB=1 THEN325
321 IF BB=2 THEN326
322 IF BB=3 THEN327
323 IF BB=4 THEN328
324 IF BB=5 THEN329
325 B5=B5+1:GOTO330
326 B6=B6+1:GOTO330
327 B7=B7+1:GOTO330
328 B8=B8+1:GOTO330
329 B9=B9+1:GOTO330
330 IF CC=1 THEN335
331 IF CC=2 THEN336
332 IF CC=3 THEN337
333 IF CC=4 THEN338
334 IF CC=5 THEN339
335 C5=C5+1:GOTO340
336 C6=C6+1:GOTO340
337 C7=C7+1:GOTO340
338 C8=C8+1:GOTO340
339 C9=C9+1:GOTO340
340 IF DD=1 THEN345
341 IF DD=2 THEN346
342 IF DD=3 THEN347
343 IF DD=4 THEN348
344 IF DD=5 THEN349
345 D5=D5+1:GOTO350
346 D6=D6+1:GOTO350
347 D7=D7+1:GOTO350
348 D8=D8+1:GOTO350
349 D9=D9+1:GOTO350
350 IF EE=1 THEN355
351 IF EE=2 THEN356
352 IF EE=3 THEN357
353 IF EE=4 THEN358
354 IF EE=5 THEN359
355 E5=E5+1:GOTO395
356 E6=E6+1:GOTO395
357 E7=E7+1:GOTO395
358 E8=E8+1:GOTO395
359 E9=E9+1:GOTO395
395 IF NC1=239 THEN 552
400 NEXT DC
```

```
552 PRINT "A=1","B=1"
553 PRINT "SURVEYS CONSIDERED="NC1,"SURVEYS USED="NU
557 PRINT "Q5="FO TAB(7) F1 TAB(7) F2 TAB(7)
558 PRINT "Q6="ED TAB(7) EF TAB(7) EG TAB(7) EH TAB(7) EI TAB(7) EJ TAB(7)
559 PRINT "Q6 CONT="EK TAB(7) EL TAB(7) EM TAB(7)
560 PRINT "Q7= " G0 TAB(7) G1 TAB(7) G2 TAB(7) G3 TAB(7) G4
565 PRINT "Q8= " H0 TAB(7) H1 TAB(7) H2 TAB(7) H3 TAB(7) H4
570 PRINT "Q9= " I0 TAB(7) I1 TAB(7) I2 TAB(7) I3 TAB(7) I4
575 PRINT "Q10=" J0 TAB(7) J1 TAB(7) J2 TAB(7) J3 TAB(7) J4
580 PRINT "Q11=" K0 TAB(7) K1 TAB(7) K2 TAB(7) K3 TAB(7) K4
585 PRINT "Q12=" L0 TAB(7) L1 TAB(7) L2 TAB(7) L3 TAB(7) L4
590 PRINT "Q13=" M0 TAB(7) M1 TAB(7) M2 TAB(7) M3 TAB(7) M4
595 PRINT "Q14=" N0 TAB(7) N1 TAB(7) N2 TAB(7) N3 TAB(7) N4
600 PRINT "Q15=" O0 TAB(7) O1 TAB(7) O2 TAB(7) O3 TAB(7) O4
605 PRINT "Q17=" P0 TAB(7) P1 TAB(7) P2 TAB(7) P3 TAB(7) P4
610 PRINT "Q18=" Q0 TAB(7) Q1 TAB(7) Q2 TAB(7) Q3 TAB(7) Q4
615 PRINT "Q19=" R0 TAB(7) R1 TAB(7) R2 TAB(7) R3 TAB(7) R4
620 PRINT "Q20=" S0 TAB(7) S1 TAB(7) S2 TAB(7) S3 TAB(7) S4
625 PRINT "Q21=" T0 TAB(7) T1 TAB(7) T2 TAB(7) T3 TAB(7) T4
630 PRINT "Q22=" U0 TAB(7) U1 TAB(7) U2 TAB(7) U3 TAB(7) U4
632 PRINT "Q23=" V0 TAB(7) V1 TAB(7) V2 TAB(7) V3 TAB(7) V4
635 PRINT "Q25=" W0 TAB(7) W1 TAB(7) W2 TAB(7) W3 TAB(7) W4
636 PRINT "Q26=" X0 TAB(7) X1 TAB(7) X2 TAB(7) X3 TAB(7) X4
640 PRINT "Q27=" Y0 TAB(7) Y1 TAB(7) Y2 TAB(7) Y3 TAB(7) Y4
645 PRINT "Q28=" Z0 TAB(7) Z1 TAB(7) Z2 TAB(7) Z3 TAB(7) Z4
650 PRINT "Q29=" A5 TAB(7) A6 TAB(7) A7 TAB(7) A8 TAB(7) A9
655 PRINT "Q30=" B5 TAB(7) B6 TAB(7) B7 TAB(7) B8 TAB(7) B9
660 PRINT "Q31=" C5 TAB(7) C6 TAB(7) C7 TAB(7) C8 TAB(7) C9
665 PRINT "Q32=" D5 TAB(7) D6 TAB(7) D7 TAB(7) D8 TAB(7) D9
670 PRINT "Q33=" E5 TAB(7) E6 TAB(7) E7 TAB(7) E8 TAB(7) E9
806 PRINT#4:CLOSE4
810 END
```